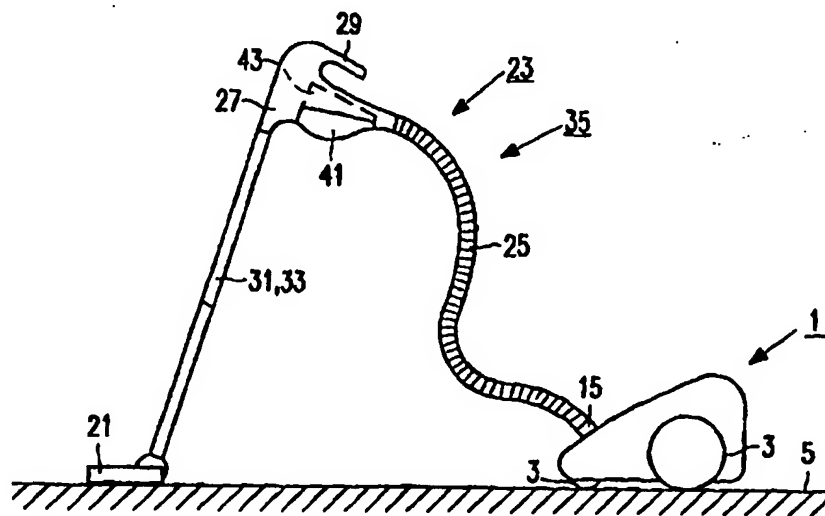




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(21) International Application Number: PCT/IB97/00213 (22) International Filing Date: 10 March 1997 (10.03.97) (30) Priority Data: 96200854.6 28 March 1996 (28.03.96) EP (34) Countries for which the regional or international application was filed: NL et al. (71) Applicant: PHILIPS ELECTRONICS N.V. [NL/NL]; Groen- woudseweg 1, NL-5621 BA Eindhoven (NL). (71) Applicant (for SE only): PHILIPS NORDEN AB [SE/SE]; Kottbygatan 7, Kista, S-164 85 Stockholm (SE). (72) Inventor: MEIJER, Natalie; Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). (74) Agent: WOLFS, Marc, J., M.; Internationaal Octrooibureau B.V., P.O. Box 220, NL-5600 AE Eindhoven (NL).	(81) Designated States: CN, JP, KR, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>	

(54) Title: FLOOR-TYPE VACUUM CLEANER WITH A DUST CHAMBER ARRANGED OUTSIDE THE HOUSING, AND ATTACHMENT FOR SUCH A FLOOR-TYPE VACUUM CLEANER



(57) Abstract

Floor-type vacuum cleaner with a movable housing (1) in which a suction unit (7) is present. The suction unit (7) can be coupled to a suction mouth (21) via a suction channel (23) which comprises a tubular channel (31), a coupling piece (27) with handle (29), a flexible hose (25), and a dust chamber (41). According to the invention, the dust chamber (41) is accommodated in the coupling piece (27). This provides a compact and light-weight housing (1), while the dust chamber (41) is readily and easily accessible to a user of the floor-type vacuum cleaner. In a special embodiment of the floor-type vacuum cleaner, the dust chamber (41) is a bush-shaped chamber which is detachably provided in the coupling piece (27). The dust chamber (41) is provided with a circular-cylindrical permanent dust filter (79) which is rotatable in the dust chamber (41) so as to cooperate with a scraper (89).

Floor-type vacuum cleaner with a dust chamber arranged outside the housing, and attachment for such a floor-type vacuum cleaner.

The invention relates to a floor-type vacuum cleaner with a movable housing within which a suction unit is present and with a suction mouth which can be coupled to the suction unit via a suction channel which comprises a tubular channel
5 attachable to the suction mouth, a flexible hose attachable to the housing, and a dust chamber, which dust chamber is arranged in a portion of the suction channel outside the housing.

The invention also relates to an attachment for a floor-type vacuum cleaner according to the invention, which attachment comprises a flexible hose and a
10 coupling piece of the floor-type vacuum cleaner.

A vacuum cleaner is known from DE-A-195 22 349 which can be used in two ways, i.e. as an upright vacuum cleaner and as a floor-type vacuum cleaner. The known vacuum cleaner comprises a housing which is fitted with two wheels by means of which the
15 housing is displaceable. Inside the housing there is an electric suction unit and a reel for an electric cord. The known vacuum cleaner further comprises a suction mouth which is coupled to the suction unit by means of an interposed suction channel. The suction channel comprises a tubular channel which is coupled to the suction mouth by means of a hinge, and a flexible hose coupled to the tubular channel and the housing. A slidable grip is fastened to the tubular
20 channel, while a dust chamber unique to the vacuum cleaner is present in the tubular channel. The known vacuum cleaner further comprises a coupling by means of which the tubular channel can be mechanically coupled to the housing. The known vacuum cleaner is an upright vacuum cleaner when the tubular channel is coupled to the housing by means of said coupling. When the tubular channel is uncoupled from the housing, however, the known
25 vacuum cleaner forms a floor-type vacuum cleaner of the kind mentioned in the opening paragraph.

Since the dust chamber of the known vacuum cleaner is accommodated in said tubular channel of the suction channel, i.e. in a portion of the suction channel which is outside the housing, the known vacuum cleaner has a housing which is compact and light

compared with a housing of a generally known and usual floor-type vacuum cleaner with a dust chamber arranged in the housing. As a result, the known vacuum cleaner when used as a floor-type vacuum cleaner is very comfortable to use. The housing in fact occupies comparatively little space, so that it can be easily manoeuvred around objects. In addition, the force to be exerted on the housing via the flexible hose for displacing the housing is comparatively small. A further advantage of the known vacuum cleaner is that the flexible hose cannot become obstructed by an accumulation of dust in this hose. The dust chamber of the known vacuum cleaner is provided in said tubular channel, so that dust particles sucked up through the suction mouth are collected in the tubular channel and do not enter the flexible hose. The operational reliability of the known vacuum cleaner is enhanced thereby.

A disadvantage of the known vacuum cleaner is that the tubular channel coupled to the suction mouth and accommodating the dust chamber has a large diameter compared with a hollow tube used between the suction mouth and the flexible hose of a generally known and usual floor-type vacuum cleaner with a dust chamber arranged in its housing. This renders said tubular channel comparatively heavy, while narrow spaces, for example the space below a cupboard, cannot be reached by the suction mouth, or only with difficulty.

It is an object of the invention to provide a floor-type vacuum cleaner of the kind mentioned in the opening paragraph with which the above disadvantages of the known vacuum cleaner are avoided, while the above advantages of the known vacuum cleaner are retained.

The invention is for this purpose characterized in that the tubular channel comprises a hollow tube, and the dust chamber is arranged in a coupling piece which is provided with a handle and by means of which said tube and the flexible hose can be coupled to one another. Since the dust chamber is accommodated in said coupling piece while the tubular channel comprises a hollow tube, the tubular channel substantially has a diameter which is comparable to a diameter of a hollow tube used between the suction mouth and the flexible hose of a generally known and usual floor-type vacuum cleaner with a dust chamber arranged in the housing. The accessibility of narrow spaces, such as the space below a cupboard, is thus influenced to the least possible degree by the presence of the tubular channel. The accommodation of the dust chamber in said coupling piece, which is also provided with the handle, moreover, improves the accessibility of the dust chamber. When emptying the dust chamber, a user of the floor-type vacuum cleaner will in fact hold the

handle adjacent the dust chamber in his/her hand, so that this user need not bend over. Since said coupling piece is of limited dimensions, the dust chamber provided in the coupling piece also has comparatively small dimensions. This limits the quantity of dust which can be collected in the dust chamber, so that the dust chamber is to be emptied after a comparatively short time. An advantage of such a small dust chamber, however, is that the generation of unpleasant odours in the dust chamber, which are blown to the exterior through the suction unit especially when the floor-type vacuum cleaner is started, is limited.

A special embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the dust chamber is detachably provided in the coupling piece. Emptying of the dust chamber is simplified in that the dust chamber is detachably provided in the coupling piece.

A further embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the dust chamber is bush-shaped and is provided between an inlet channel of the coupling piece which is coupled to the tubular channel during operation and an outlet channel of the coupling piece which is coupled to the flexible hose during operation. The dust chamber in this further embodiment is easily accessible to the user and can be taken from the coupling piece by hand in a simple movement.

A yet further embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the dust chamber comprises a closable inlet. The use of the closable inlet prevents the dust present in the dust chamber issuing from the dust chamber to the exterior when this is not desired during detaching of the dust chamber from the coupling piece.

A particular embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the inlet of the dust chamber is closable by means of a lid which is pivotable relative to the dust chamber. The use of the pivotable lid provides a simple and reliable closure of the inlet of the dust chamber.

The dust chamber in the coupling piece is suitable, for example, for accommodating a discardable dust bag. Instead of a discardable dust bag, the dust chamber may also contain, for example, a permanent dust filter. Emptying of the dust chamber is further simplified in that the permanent dust filter is detachably provided in the dust chamber. A further embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the dust chamber is provided with a permanent dust filter which is movable inside the dust chamber so as to cooperate with a scraper. The use of the movable dust filter and the scraper renders it possible to remove dust particles adhering to the dust

filter in a simple and effective manner from the dust filler when the user of the floor-type vacuum cleaner moves the dust filter in the dust chamber during emptying of the dust chamber.

A still further embodiment of a floor-type vacuum cleaner according to the invention is characterized in that the permanent dust filter is circular-cylindrical and is rotatable in the dust chamber about a centreline of the dust filter, while the scraper comprises fins which are arranged around the dust filter. The use of the circular-cylindrical dust filter and the fins arranged around the dust filter provides a simple and effective construction of the dust filter and the scraper cooperating therewith. Dust particles sticking to the dust filter can be removed from the dust filter by means of a simple rotary movement of the dust filter.

The invention will be explained in more detail below with reference to the drawing in which

- Fig. 1 shows a floor-type vacuum cleaner according to the invention,
Fig. 2 is a diagrammatic cross-section through a housing of the floor-type vacuum cleaner of Fig. 1,
Fig. 3 shows a coupling piece with handle of the floor-type vacuum cleaner of Fig. 1,
Fig. 4 is a cross-section of the coupling piece of Fig. 1, and
Fig. 5 is a cross-section of a dust chamber provided in the coupling piece taken on the line V-V in Fig. 4.

A floor-type vacuum cleaner according to the invention shown in Fig. 1 comprises a synthetic-resin housing 1 provided with a number of wheels 3 by means of which the housing 1 is displaceable, for example over a surface 5 to be cleaned. As Fig. 2 shows, a suction unit 7 comprising an electric motor 9 and a blade wheel 11 which can be driven by the electric motor 9 is present in the housing 1. The blade wheel 11 adjoins a vacuum chamber 13 which is provided with an inlet 15 arranged in the housing 1. The housing 1 further contains a reel 17 for an electric cord 19 by means of which the motor 9 is electrically supplied during operation.

As Fig. 1 shows, the floor-type vacuum cleaner further comprises a suction mouth 21 which can be coupled to the suction unit 7 via a suction channel 23. The suction channel 23 comprises in that order the vacuum chamber 13 mentioned above and the

inlet 15 in the housing 1, a flexible synthetic-resin hose 25 which is detachably coupled to the inlet 15, a coupling piece 27 fitted with a handle 29, a tubular channel 31 comprising a hollow metal tube 33, and the suction mouth 21 mentioned above. The flexible hose 25 and the coupling piece 27 together form an attachment 35 of the floor-type vacuum cleaner which is detachably coupled to the tubular channel 31.

As is shown diagrammatically in Fig. 1 and in detail in Fig. 3, a dust chamber 41 unique to the floor-type vacuum cleaner is present in the coupling piece 27, i.e. in a portion of the suction channel 23 which is outside the housing 1, in which dust chamber dust particles are collected during operation which are sucked up from the surface 5 to be cleaned through the suction mouth 21 and the tubular channel 31. Since the dust chamber 41 is outside the housing 1, the housing 1 is compact and light compared with a housing of a generally known and usual floor-type vacuum cleaner with a dust chamber arranged in the housing. The housing 1 occupies little storage space as a result. Moreover, the housing 1 is easy to handle during use. The housing 1 can be easily manoeuvred around objects and can be displaced over the surface 5 to be cleaned through the exertion of a small force via the flexible hose 25. Since the dust chamber 41 is provided in the coupling piece 27, i.e. in the suction channel 23 upstream of the flexible hose 25, dust particles sucked up through the suction mouth 21 and the tubular channel 31 do not enter the flexible hose 25 and the inlet 15 of the housing 1. It is prevented thereby that the flexible hose 25 or the inlet 15 can become obstructed by an accumulation of dust.

The fact that the dust chamber 41 arranged outside the housing 1 is accommodated in the coupling piece 27 means that no special constructional adaptations are necessary for the tubular channel 31 present between the suction mouth 21 and the coupling piece 27 compared with a tubular channel constructed as a hollow tube in a generally known and usual floor-type vacuum cleaner with a dust chamber in the housing. As a result, the accessibility of narrow spaces, such as the space below a cupboard or bed, to the suction mouth 21 is comparable to the accessibility of such narrow spaces to a generally known and usual floor-type vacuum cleaner with a dust chamber in the housing. Since the coupling piece 27 is of limited dimensions, the dimensions of the dust chamber 41 are smaller than the dimensions of the dust chamber arranged in the housing of a generally known and usual floor-type vacuum cleaner. This means that the dust chamber 41 is to be emptied after a shorter period. This has the advantage, however, that the generation of unpleasant odours in the dust chamber 41 is limited, which odours are blown to the exterior through the suction channel 23 and the suction unit 7, in particular immediately after switching-on of the floor-

type vacuum cleaner.

The disadvantage that the dust chamber 41 is to be emptied after a comparatively short period is counterbalanced by the further advantage that the dust chamber 41 is readily accessible to a user of the floor-type vacuum cleaner thanks to its arrangement in the coupling piece 27. When emptying the dust chamber 41, in fact, the user can hold on to the handle 29 of the coupling piece 27, so that the user need not empty the dust chamber 41 in a bent position as is the case with a generally known and usual floor-type vacuum cleaner with a dust chamber arranged in the housing.

Emptying of the dust chamber 41 is further simplified in that the dust chamber 41 is detachably mounted in the coupling piece 27. As Figs. 3 and 4 show in detail, the dust chamber 41 is for this purpose constructed as a bush-shaped chamber which is detachably provided in a cavity 43 in the coupling piece 27. In a mounted state shown in Figs. 3 and 4, the bush-shaped dust chamber 41 is present between an inlet channel 45 of the coupling piece 27 and an outlet channel 47 of the coupling piece 27. The coupling piece 27 shown in Figs. 3 and 4 forms part of the attachment 35 mentioned above which can be coupled to the tubular channel 31, the inlet channel 45 being attachable to the tubular channel 31 not shown in Figs. 3 and 4 in a generally known and usual manner, and the outlet channel 47 being permanently coupled to the flexible hose 25 not shown in Fig. 4 in a generally known and usual manner. As Fig. 4 shows, the dust chamber 41 comprises a tag 49 which is in engagement with a tag 51 of the coupling piece 27 in the mounted state of the dust chamber 41. In the mounted state, the dust chamber 41 is retained in the cavity 43 of the coupling piece 27 by means of said tags 49 and 51 and by means of two generally known and usual fastening elements 53 such as, for example, clamping members or locks. The fastening elements 53 are arranged on either side of the cavity 43, so that only one of the two fastening elements 53 is visible in Figs. 3 and 4. The described arrangement of the dust chamber 41 in the cavity 43 of the coupling piece 27 renders the dust chamber 41 readily accessible to a user of the floor-type vacuum cleaner. The dust chamber 41 can furthermore be detached from the coupling piece 27 in a simple manual operation. To this end, the user holds the handle 29 with one hand and uncouples the fastening elements 53 with the other hand. Then the dust chamber 41 is rotated in a simple movement about an axis of rotation defined by the tags 49 and 51 into a position 41' indicated with broken lines in Fig. 3 in which the dust chamber 41 can be taken from the coupling piece 27.

As Fig. 4 further shows, the dust chamber 41 comprises an inlet 55 which is closable by means of a lid 57 which is pivotable relative to the dust chamber 41

about a hinge 59. The lid 57 has an opening 61 which merges into the inlet channel 45 of the coupling piece 27 with the dust chamber 41 in the mounted state. A rubber valve 63 provided with a rubber sealing ring 65 is mounted in the opening 61. In the mounted state of the dust chamber 41, the sealing ring 65 bears on an edge 67 of the inlet channel 45. The valve 63 comprises a rubber flap 69 which bears on the sealing ring 65 in the absence of an underpressure in the dust chamber 41 and thus closes the opening 61, and which bends towards the dust chamber 41 under the influence of an underpressure generated in the dust chamber 41 by the suction unit 7, thus releasing the opening 61. The use of the lid 57 with the valve 63 prevents dust collected in the dust chamber 41 being spilled from the dust chamber 41 when the latter is being uncoupled. To empty the dust chamber 41 after it has been uncoupled from the coupling piece 27, the user may easily hinge open the lid 57 by pressing a knob 71 which belongs to the lid 57.

To collect dust particles sucked up through the suction mouth 21 in the dust chamber 41, the dust chamber 41 is provided, for example, with an exchangeable throw-away dust bag 73. In Fig. 4, a cardboard positioning plate 75 and a filter bag 77 of the discardable dust bag 73 are indicated with a broken line, the positioning plate 75 being inserted into a positioning groove 79 provided in the dust chamber 41 adjacent the lid 57. In the embodiment of the coupling piece 27 shown in Fig. 4, the dust chamber 41 is provided with a permanent dust filter 81 instead of the discardable dust bag 73. As Fig. 4 shows, the permanent dust filter 81 comprises a circular-cylindrical sleeve 83 of filter material which is fastened to an annular synthetic-resin base 85. The base 85 is detachably accommodated in a round collar 87 of the dust chamber 41 which forms an outlet of the dust chamber 41 and merges into the outlet channel 47 of the coupling piece 27 when the dust chamber 41 is in the mounted position. During operation, an air flow indicated with arrows in Fig. 4 will take place through the sleeve 83 of the permanent dust filter 81 in the dust chamber 41 as a result of an underpressure generated by the suction unit 7, so that dust particles present in the air flow will first accumulate around the sleeve 83 and subsequently in the entire dust chamber 41. When the dust chamber 41 is emptied, dust particles which have collected immediately around the sleeve 83 will adhere to the sleeve 83. The dust particles adhering to the sleeve 83 can be removed in that the permanent dust filter 81 is removed from the dust chamber 41 by means of a handle 89 fastened to the base 85, after which the sleeve 83 can be manually cleaned. As Figs. 4 and 5 show, however, the dust chamber 41 is also provided with a scraper 91 with a number, for example three or four, of fins 93 arranged around the sleeve 83 of the dust filter 81 for cooperation with the sleeve 83. A rotation of the permanent dust

filter 81 in the dust chamber 41 about the centreline 95 of the sleeve 83 by means of the handle 89 will cause dust particles adhering to the sleeve 83 to be removed from the sleeve 83 by the fins 93 of the scraper 91, so that the permanent dust filter 81 can be cleaned in a simple and effective manner by the user during emptying of the dust chamber 41 without
5 being removed from the dust chamber 41.

In the floor-type vacuum cleaner according to the invention as described above, the dust chamber 41 is detachably accommodated in the coupling piece 27. It is noted that the invention also relates to floor-type vacuum cleaners in which the dust chamber 41 is non-detachably mounted in the coupling piece. The dust chamber in such a floor-type
10 vacuum cleaner comprises, for example, a detachable lid and an exchangeable dust bag.

It is further noted that the dust chamber 41 according to the invention may be provided in the coupling piece 27 in an alternative manner. Thus, for example, the coupling piece 27 may be fitted with a semicircular handle, while the dust chamber is circular-cylindrical and extends around a centreline of the semicircular handle.

It is further noted that an alternative type of dust filter and an alternative
15 type of scraper may be used instead of the permanent dust filter 81 with the rotatable circular-cylindrical sleeve 83 and the scraper 91 with the fins 93 arranged around the dust filter 81. Thus, for example, the scraper 91 may be provided with a different number of fins 93, for example one or two fins. The circular-cylindrical dust filter 81 may be, for example,
20 movable parallel to the centreline 95 in the dust chamber 41, in which case the scraper 91 comprises a scraping ring arranged around the dust filter. The permanent dust filter may alternatively, for example, comprise a flat plate of filter material which is rotatable in its own plane, in which case the scraper comprises at least one fin extending transverse to said flat plate.

It is finally noted that the dust chamber 41 with the permanent dust filter
25 81 may be entirely or partly manufactured from a transparent synthetic resin, so that the quantity of dust present in the dust chamber 41 is visible to the user of the floor-type vacuum cleaner. This means that the floor-type vacuum cleaner need not be provided with a mechanical, pneumatic, or electronic indicator, usual and known per se, of the degree of
30 filling of the dust chamber 41.

CLAIMS:

1. A floor-type vacuum cleaner with a movable housing within which a suction unit is present and with a suction mouth which can be coupled to the suction unit via a suction channel which comprises a tubular channel attachable to the suction mouth, a flexible hose attachable to the housing, and a dust chamber, which dust chamber is arranged
5 in a portion of the suction channel outside the housing, characterized in that the tubular channel comprises a hollow tube, and the dust chamber is arranged in a coupling piece which is provided with a handle and by means of which said tube and the flexible hose can be coupled to one another.
2. A floor-type vacuum cleaner as claimed in Claim 1, characterized in that
10 the dust chamber is detachably provided in the coupling piece.
3. A floor-type vacuum cleaner as claimed in Claim 2, characterized in that the dust chamber is bush-shaped and is provided between an inlet channel of the coupling piece which is coupled to the tubular channel during operation and an outlet channel of the coupling piece which is coupled to the flexible hose during operation.
- 15 4. A floor-type vacuum cleaner as claimed in Claim 2 or 3, characterized in that the dust chamber comprises a closable inlet.
5. A floor-type vacuum cleaner as claimed in Claim 4, characterized in that the inlet of the dust chamber is closable by means of a lid which is pivotable relative to the dust chamber.
- 20 6. A floor-type vacuum cleaner as claimed in Claim 2, 3, 4 or 5, characterized in that the dust chamber is provided with a permanent dust filter which is movable inside the dust chamber so as to cooperate with a scraper.
7. A floor-type vacuum cleaner as claimed in Claim 6, characterized in that the permanent dust filter is circular-cylindrical and is rotatable in the dust chamber about a
25 centreline of the dust filter, while the scraper comprises fins which are arranged around the dust filter.
8. An attachment for a floor-type vacuum cleaner as claimed in any one of the Claims 1 to 7, which attachment comprises the flexible hose and the coupling piece of the floor-type vacuum cleaner.

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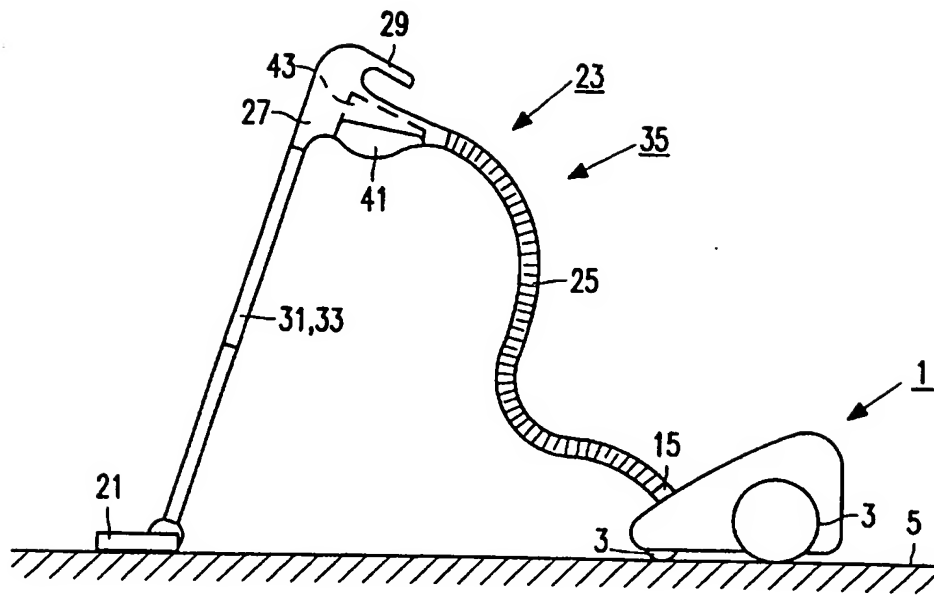


FIG. 1

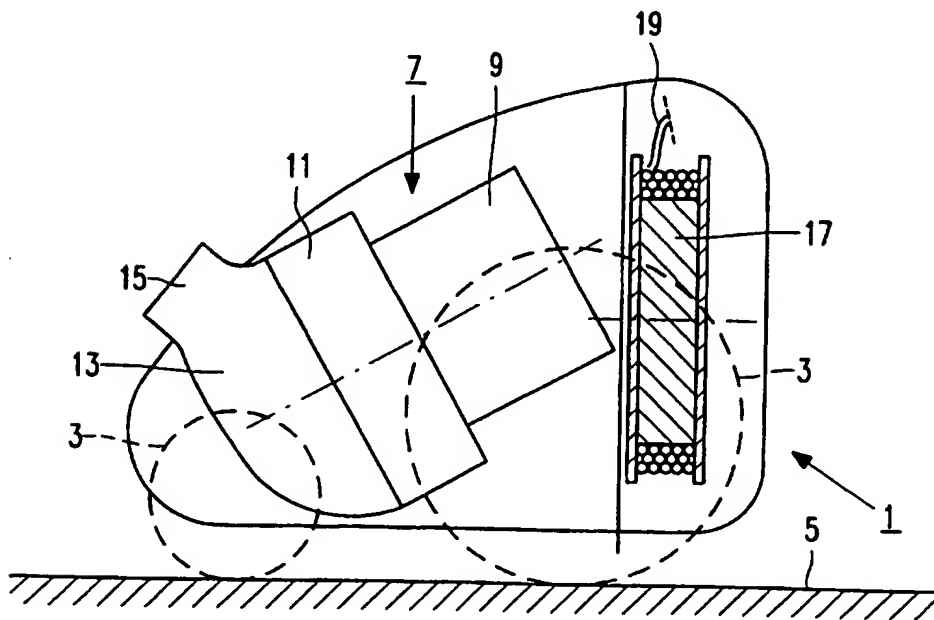


FIG. 2

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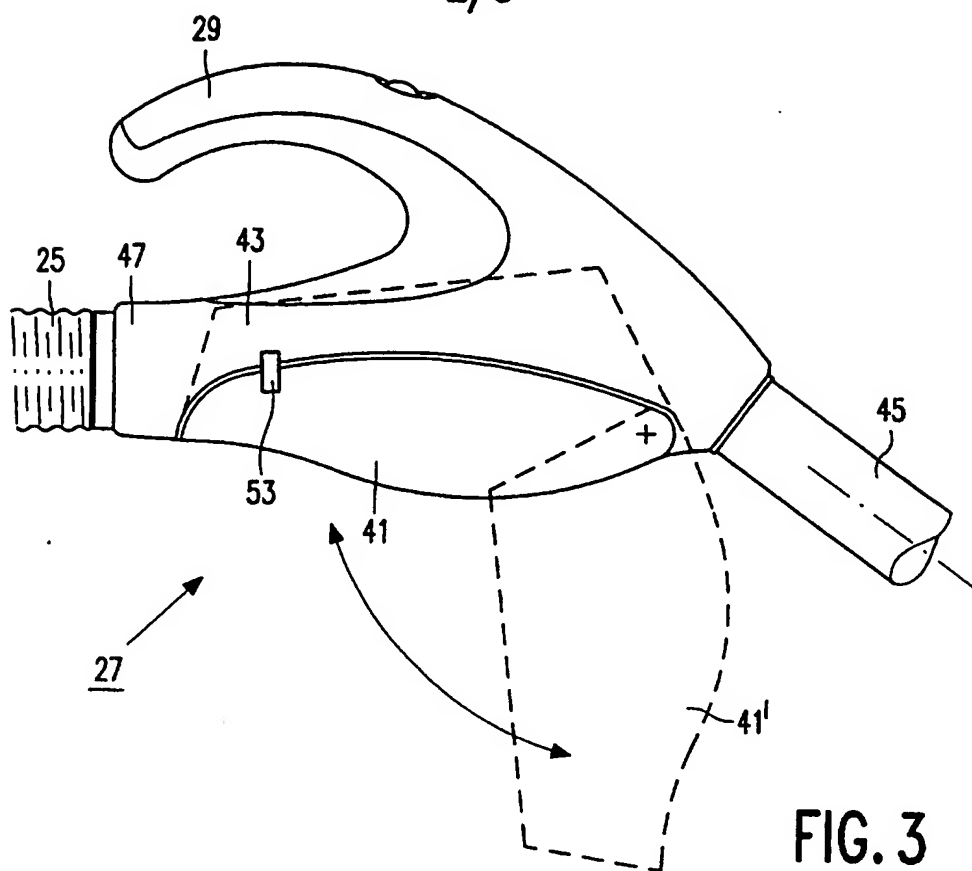


FIG. 3

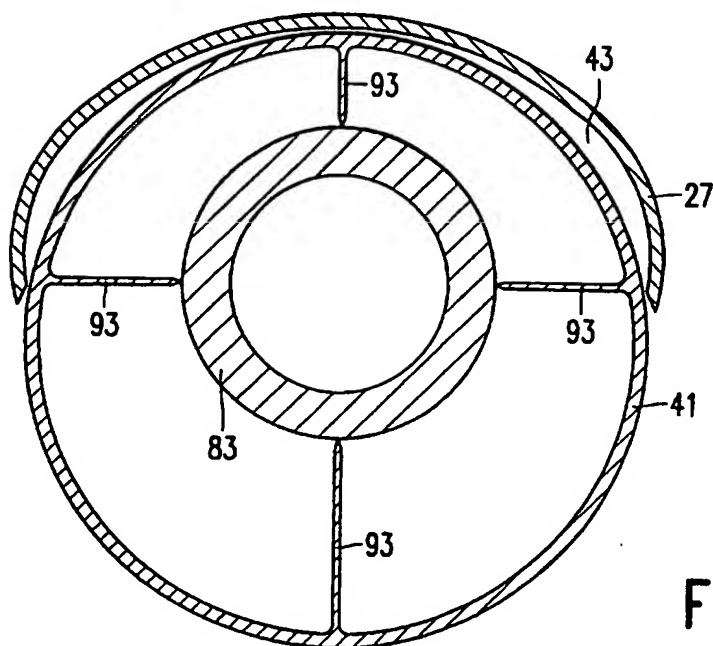


FIG. 5

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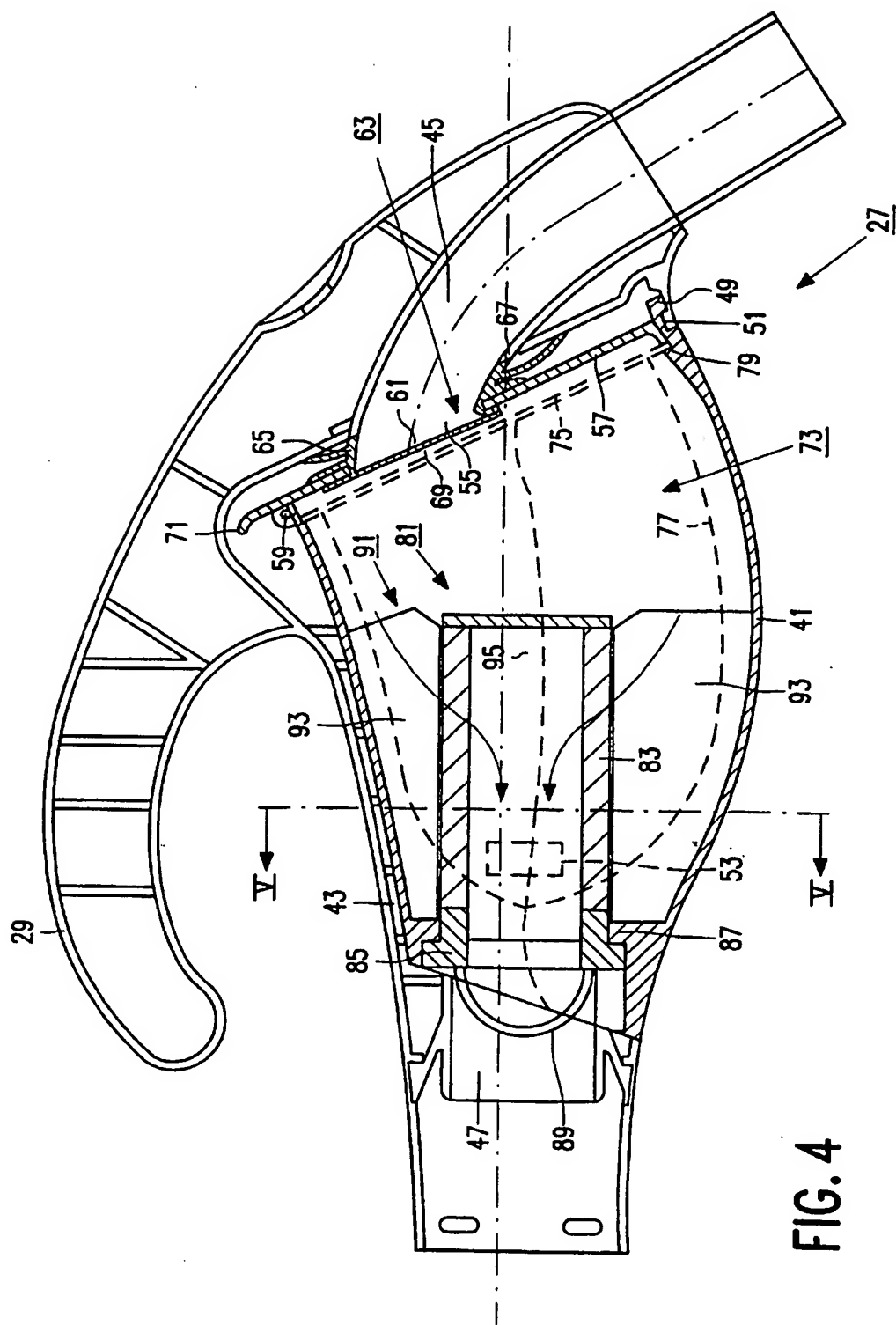


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 97/00213

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A47L 9/10, A47L 9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 2447422 A1 (AB ELECTROLUX), 17 April 1975 (17.04.75), figures 1,2 --	1-5,8
X	US 5350432 A (LEE), 27 Sept 1994 (27.09.94), figures 2-5 --	1,2,8
A	DE 19522349 A1 (DAEWOO ELECTRONICS CO., LTD.), 4 January 1996 (04.01.96) -- -----	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

- * Special categories of cited documents:
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- "P" document published prior to the international filing date but later than the priority date claimed
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Date of the actual completion of the international search

18 April 1997

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB 97/00213

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